

Message Text

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TO AMEMBASSY PARIS
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C O N F I D E N T I A L STATE 180411

SOECD, EXCON

E.O. 11652: XGDS-1

TAGS: ESTC, COCOM, RO, UK, US

SUBJECT: CRYSTAL PULLERS

REF: A) COCOM DOC (78)61

1. FOLLOWING MATERIAL TRANSMITTED TO UK EMBASSY
WASHINGTON JULY 17 AS US ANALYSIS OF DIFFERENCES
BETWEEN UK'S MSR2 CRYSTAL GROWTH SYSTEM AND US VARIAN
2850: (BEGIN TEXT)

THE VARIAN MODEL 2850 CZOCHRALSKI CRYSTAL GROWING
SYSTEM AS DELIVERED IN A STANDARD CONFIGURATION WOULD
BE UNSATISFACTORY FOR GROWTH OF GAAS SINGLE CRYSTALS
BY THE LEC PROCESS. THIS IS NOT TO SAY THAT THE PULLER
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COULD NOT BE MODIFIED FOR USE IN GROWING LEC GAAS BUT
THE MODIFICATIONS WOULD BE MAJOR.

THE METALS RESEARCH CORP. MSR-2 CRYSTAL PULLING SYSTEM
IS CAPABLE OF PREPARING 38 MM DIAMETER CRYSTALS OF LEC
GAAS IN THE AS DELIVERED CONFIGURATION. THIS CONCL;SION
IS BASED UPON PUBLISHED INFORMATION AND THE MANUFACTURER'S

CLAIMS.

SPECIFICALLY THE TWO SYSTEMS DIFFER IN THE FOLLOWING RESPECTS:

A. THE MODEL 2850 HAS A STANDARD 10 INCH HOT ZONE (OPTIONAL 8 INCH) WHICH HAS BEEN THERMALLY DESIGNED TO PULL SILICON BUT NOT LEC GAAS WHICH REQUIRES DIFFERENT THERMAL CHARACTERISTICS.

THE MSR-2 IS A RADIO FREQUENCY HEATED UNIT. THIS ENABLES THE OPERATOR TO EASILY CHANGE HEATING COILS TO ACCOMMODATE A VARIETY OF CRUCIBLE SIZES.

B. SEED PULL AND ROTATION CAPABILITY.

THE VARIAN MODEL 2850 HAS A SATISFACTORY SEED ROTATION SYSTEM. THE MINIMUM SEED PULL SPEED OF 18 MM/HOUR IS TOO FAST FOR THE USUAL GROWTH OF GAAS CRYSTALS AND WOULD REQUIRE A GEAR OR MOTOR CHANGE TO REDUCE THE MINIMUM PULL SPEED.

THE MSR-2 HAS A SATISFACTORY SEED ROTATION SYSTEM AND THE SEED PULL SPEED IS WELL WITHIN THE USUAL RANGE USED TO PULL GOOD QUALITY GAAS.

C. THE MSR-2 IS NOT EQUIPPED WITH AUTOMATIC DIAMETER.
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THE VARIAN 2850 IS EQUIPPED WITH AN AUTOMATIC DIAMETER CONTROL SYSTEM THAT WOULD NOT BE USABLE FOR LEC SINCE IT SENSES CHANGES IN INTENSITY AT THE MENISCUS. THE BORIC OXIDE WOULD MAKE THE SYSTEM INSENSITIVE AND ERRATIC.

D. PRESSURE CAPABILITIES.

THE VARIAN 2850 HAS A VACUUM CAPABILITY THAT THE MSR-2 DOES NOT HAVE WHEN EQUIPPED WITH A QUARTZ CHAMBER. BOTH SYSTEMS ARE CAPABLE OF BEING OPERATED AT SMALL OVERPRESSURES WHICH IS ALL THAT IS REQUIRED IN THE WAY OF PRESSURE FOR LEC GROWTH OF GAAS.

THE MAJOR DIFFERENCE BETWEEN THE TWO SYSTEMS IS THAT THE VARIAN 2850 IS SPECIALLY DESIGNED FOR LARGE CAPACITY AND WOULD REQUIRE MAJOR MODIFICATIONS TO BE USED FOR OTHER MATERIALS. THE MSR-2 CRYSTAL PULLING SYSTEM IS DESIGNED TO BE VERSATILE AND CAN BE USED FOR A VARIETY OF MATERIALS BUT IT DOES HAVE A MUCH SMALLER CAPACITY THAN THE VARIAN 2850. (END TEXT)

2. FOR LONDON: EMBASSY IS REQUESTED TO MAKE THIS AVAILABLE TO DEPARTMENT OF TRADE OFFICIAL GRAHAM DOLBY, WHO WILL ACCOMPANY UK EXPERT BARDSLEY TO US FOR JULY 24 MEETING WITH US TECHNICIANS. DOLBY SHOULD BE REQUESTED TO PROVIDE UK ANALYSIS SUPPORTING THEIR THESIS THAT

IDENTICAL PRIOR TO JULY 24 MEETING. EMBASSY, IF DESIRED, MAY WISH TO MAKE MATERIAL AVAILABLE TO FOREIGN OFFICE OFFICIALS AS WELL.

3. FOR PARIS: PLEASE BRING THIS MATERIAL TO THE ATTENTION OF THE UK DEL, ADVISING HIM OF OUR APPROACHES IN LONDON AND WASHINGTON.

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4. FYI: DEFINITIONS

-- LEC: LIQUID-ENCAPSULATED CZOCHRALSKI.SHOULD BE CAPITALIZED. - -

-- GAAS: CHEMICAL SYMBOL FOR GALLIUM ARSENIDE. "G" AND SECOND "A" CAPITALIZED. CHRISTOPHER

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NNN

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